

ASTWMO Alternative Fuel Equipment Compatibility Guidance

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Alternative Fuels

- Gasoline blends containing >10 % ethanol
- Diesel blends containing > 20 % biodiesel
- Currently does not include ULSD, Green Diesel, etc.

ASTSWMO Guidance Document

- Intended to serve as a resource for compatibility evaluation
- Includes a compatibility evaluation checklist with instructions
- Includes links to informational resources created and maintained by other public and private organizations
- Includes case summaries highlighting consequences of incompatible equipment on UST systems

Equipment compatibility records

- Equipment compatibility should be demonstrated through listing by a nationally recognized independent testing laboratory; equipment or component manufacturer approval, unless the implementing agency determines an alternative method to be no less protective of human health and the environment.
- Owners and operators should maintain compatibility records for the life of the equipment or component for all new or replaced equipment and for UST systems storing Alternative fuels.

Alternative Fuel Properties

- **Higher Solubility:** tend to have a “cleaning agent” effect, mobilizing sludge. Because of their higher solubility these fuels can degrade, soften, and seep through certain hoses, gaskets, seals, elastomers glues and plastics with prolonged exposure.
- **Higher Water retention capacity:** can lead to phase separation and in turn can foster microbial growth. Microbial activity, spurred by the presence of water and a food source (fuel) can accelerate galvanic and pitting corrosion.
- **Higher Conductivity:** Water, chemical contaminants, and salts in the fuel system can increase fluid conductivity. In conductive environments, anodic metals (soft metals like zinc, brass, lead, aluminum and copper) tend to corrode more readily in the presence of cathodic metals (steel). Avoid components made from soft metals.

Compatibility Evaluation Checklist

- Designed to assist in the review of each associated component to verify compatibility
- Documentation for owner / operator prior to the conversion.
- States can adopt this template or tailor it to fit their particular program requirements and review process.

UNDERGROUND STORAGE TANK ALTERNATIVE FUEL INSTALLATION / CONVERSION APPLICATION

INSTRUCTIONS: Part I if this form is to be submitted to the (STATE DEPT NAME) along with the plan submittal for new installations, or submitted independently for conversions of existing systems from conventional motor fuels to blends greater than 10% ethanol or for biodiesel blends greater than 20%. For existing tank systems, Part I of this form shall be completed and submitted for approval prior to the conversion of the storage tank system. If a manufacturer or model/brand cannot be determined, write "UNK" in the corresponding box, write "HC" and the treatment material if a hard-coat treatment is used to achieve compatibility, write "NA" if the tank/piping system does not have the listed component. Use the comment section at the bottom of page one for "UNK" or "HC" explanations and attach analysis documentation for review. Part II shall be given by the contractor to the owner/operator for completion prior to system operation and retained on-site for inspector review. "Listed/Verified Components" shall be confirmed and documented by a Nationally Recognized Testing Laboratory (NRTL) for use with the specific gasoline-ethanol / biodiesel blends. Underwriter Laboratories is one of the recognized NRTL that tests and lists such components.

Part I

1. OWNER INFORMATION Contact Person Company Name Mailing Address City, State, Zip Code		2. PROJECT INFORMATION Facility Name Site Address <input type="checkbox"/> City <input type="checkbox"/> Village <input type="checkbox"/> Town of: County Telephone Number Fax Number () () () ()		3. CONTRACTOR INFORMATION Contractor or Professional Engineer Name Mailing Address City, State, Zip Code Contact Person	
		4. Tank Information Fuel blend to be stored - Ethanol Blend Biodiesel Blend Tank Orientation: <input type="checkbox"/> Underground <input type="checkbox"/> Aboveground <input type="checkbox"/> New Tank <input type="checkbox"/> Existing Tank → Date Installed: _____ Registration ID #: _____ Tank leak detection method: <input type="checkbox"/> Automatic tank gauging <input type="checkbox"/> Continuous ATG <input type="checkbox"/> Interstitial monitoring <input type="checkbox"/> Statistical Inventory Reconciliation (SIR) <input type="checkbox"/> Inventory control and tightness testing		NRTL Listed or Verified by Manufacturer for Fuel to be stored Equipment Manufacturer Model/Brand	
				Note: Tanks with interior linings will not be approved for alternative fuel storage unless documentation is provided for confirmation of compatibility.	
				<input type="checkbox"/> Listed <input type="checkbox"/> Manufacturer Verified Tank construction material <input type="checkbox"/> Listed <input type="checkbox"/> Manufacturer Verified Spill bucket <input type="checkbox"/> Listed <input type="checkbox"/> Manufacturer Verified Overfill/Auto shut-off/Ball float <input type="checkbox"/> Listed <input type="checkbox"/> Manufacturer Verified Drop tube <input type="checkbox"/> Listed <input type="checkbox"/> Manufacturer Verified STP/Suction pump/O-rings/Gaskets <input type="checkbox"/> Listed <input type="checkbox"/> Manufacturer Verified Leak detection probes <input type="checkbox"/> Listed <input type="checkbox"/> Manufacturer Verified Sump monitoring sensors <input type="checkbox"/> Listed <input type="checkbox"/> Manufacturer Verified	

Component:	Equipment Manufacturer	Model/Brand	Manufacturer for Fuel to be stored
Tank construction material		<input type="checkbox"/> Listed	Manufacturer Verified
Spill bucket		<input type="checkbox"/> Listed	Manufacturer Verified
Overfill/Auto shut-off / Ball float		<input type="checkbox"/> Listed	Manufacturer Verified
Drop tube		<input type="checkbox"/> Listed	Manufacturer Verified
STP/Suction pump / O-rings / Gaskets		<input type="checkbox"/> Listed	Manufacturer Verified
Leak detection probes		<input type="checkbox"/> Listed	Manufacturer Verified
Sump monitoring sensors		<input type="checkbox"/> Listed	Manufacturer Verified
5. Pipe Information: <input type="checkbox"/> New <input type="checkbox"/> Existing <input type="checkbox"/> Mixed (New/Existing) Manuf. Make/Model:		Existing Pipe Install Date:	
Configuration: <input type="checkbox"/> Single wall <input type="checkbox"/> Double wall Type: <input type="checkbox"/> Steel <input type="checkbox"/> Fiberglass <input type="checkbox"/> Flexible <input type="checkbox"/> Other		Sumps: <input type="checkbox"/> Submersible <input type="checkbox"/> Pipe Connections	
Pipe fitting/valve material		<input type="checkbox"/> Listed	Manufacturer Verified
Gaskets / seals		<input type="checkbox"/> Listed	Manufacturer Verified
Pipe sealant/ adhesive		<input type="checkbox"/> Listed	Manufacturer Verified
Flex connector		<input type="checkbox"/> Listed	Manufacturer Verified
Elec. Line leak detector		<input type="checkbox"/> Listed	Manufacturer Verified
Mech. Flow restrictor		<input type="checkbox"/> Listed	Manufacturer Verified
6. Dispenser Information: Dedicated Disp. Hose: <input type="checkbox"/> Yes <input type="checkbox"/> No Blending dispenser: <input type="checkbox"/> Yes <input type="checkbox"/> No Containment sump under dispenser: <input type="checkbox"/> Yes <input type="checkbox"/> No			
Dispenser / Suction Pump		<input type="checkbox"/> Listed	Manufacturer Verified
Dispenser piping		<input type="checkbox"/> Listed	Manufacturer Verified
Dispenser Sump		<input type="checkbox"/> Listed	Manufacturer Verified
Dispenser sump sensor		<input type="checkbox"/> Listed	Manufacturer Verified
Gaskets/seals		<input type="checkbox"/> Listed	Manufacturer Verified
Blending valve		<input type="checkbox"/> Listed	Manufacturer Verified
Check valve		<input type="checkbox"/> Listed	Manufacturer Verified
Meter		<input type="checkbox"/> Listed	Manufacturer Verified
Emergency valve		<input type="checkbox"/> Listed	Manufacturer Verified
Fuel filters		<input type="checkbox"/> Listed	Manufacturer Verified
Break-away device		<input type="checkbox"/> Listed	Manufacturer Verified
Nozzle(s)/Swivel(s)		<input type="checkbox"/> Listed	Manufacturer Verified
Hose(s) and hose fittings		<input type="checkbox"/> Listed	Manufacturer Verified
Additional Comments:			

I certify by signature that I have personally examined and/or am familiar with the information submitted to verify system alternative fuel compatibility, and the information is true, accurate, and complete.

Date: _____
Signature of licensed petroleum equipment contractor or professional engineer

Part II

Responsibilities of Tank Owner/Operator Before Blends of Greater than 10% Ethanol or 20% Biodiesel is Transferred to the Tank

- Determine equipment compatibility - Part I of this form.
- Inform the facility's UST insurance carrier of plans to convert to a gasoline-ethanol blend exceeding 10% ethanol or biodiesel exceeding 20%. The UST insurance carrier may have additional requirements other than what (STATE REG.) requires.
- Obtain an amended certificate of insurance indicating UST coverage for the ethanol or biodiesel blend stored and submit to the storage tank regulation office.
- Check for water in the tank. No level of water is acceptable for gasoline-ethanol blended fuels due to the possibility of phase separation.
- All visible fittings and connections at the top of the tank are tight (no vapors escape and no water enters).
- Verify the appropriate venttop (pressure vacuum / updraft) is present for the type of product being stored.
- Stage I Vapor Recovery installed and operational if required.
- Sump and spill containment covers secured to prevent water from entering. Spill buckets should not have drain back mechanisms.
- Water infiltration problems fixed if necessary.
- The tank has been cleaned of all water and sediment per API Publication 2015 and NFPA 326. Company providing service:

Company providing service: _____
City: _____ State: _____ Telephone #: _____

- How / where is product being disposed of.
- Fill labeling - Identify fill port and paint access cover according to API RP 1637.
- Dispenser labeling – label dispenser in compliance with State Regulations.

First Delivery

- Tank filled to 80 percent capacity (recommended by the Renewable Fuels Association or RFA) and kept as full as possible for 7 to 10 days.
- Conduct a precision test of the tank system (0.1 gph leak rate) with ATG system within seven days after tank is filled to make sure system is tight and leak detection equipment is operating properly. Report any "Fail" results.
- Test for water (use alcohol compatible paste if you stick your tanks) at the beginning of each shift for the first 48 hours after delivery (RFA). If there is water in the tank, remove it, find out how it got there and fix it so it doesn't occur again.
- Have dispenser calibrated prior to any retail sales.
- Prior to dispensing, notify State Regulator Inspector that ethanol or biodiesel has been delivered and the dispensing system is going operational.
- Submit a completed copy of this Alternative Fuels Application Form to the State regulation office.

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Ongoing Maintenance Responsibilities

- Check for water daily with your stick or ATG system. No level of water in the tank is acceptable.
- If product seems to pump slowly, check and replace filters.
- Calibrate dispenser meter at the time of conversion and two weeks after conversion to verify meter accuracy. Particulate materials may cause excessive meter wear, which would require more frequent meter calibration (API RP 1626)
- Conduct daily, visual inspections of the dispenser and dispenser sump (secondary containment) beneath the dispenser (if one is installed) and all the other items on the inspection form. This form must be kept on site and available for inspector review.

Tank Owner Signature

(Note: By signing, signer is acknowledging that all the above preparatory items have been conducted, and awareness of ongoing responsibilities.)

Print Tank Owner Name

Date

Failure to submit this form with all items completed will result in the tank and dispenser being subject to red-tagging and immediate shutdown.
A tank with any "unknowns" will not be approved for service for gasoline-ethanol blends exceeding 10% ethanol or biodiesel blends exceeding 20% without a statement from the licensed contractor or professional engineer stating that in their professional judgment the system is acceptable for service in the alternative fuel. Without such statement the tank and dispenser will be subject to red-tagging and shutdown.

Resources, References, and Web Links

- EPA Biofuels Compendium
- Links to UL Standards and Product Listings (UL, STI , PEI)
- General Material Compatibility Studies (ORNLI reports, etc)
- General Compatibility Guidance References (States, etc)

Case Study – SC



- Site Location: Lexington, SC
- Fuel Type: E85 Product Type: Gasoline/Ethanol Blend
- Issue Type: Other (STP, dispenser, spill bucket, tank probe, etc)
- Equipment involved: STP
- Additional Details:

FE Petro STP less than one yr old in the picture; was brand new when installed
- *Description of Issue:*

In early 2006, prior to the formal introduction of the “Alternative Fuel Checklist”, this site converted a tank to E85 without the knowledge of the SC UST Program. In 2007, the inspector visited this site for a routine compliance inspection. The inspector noted excessive corrosion on the submersible pump and its associated wiring.

Case Study – SC



- *Findings and Resolution:*

Upon receipt of a completed “Alternative Fuel Checklist”, it was determined that the submersible pump was the appropriate “AG” (alternative fuel) model and therefore compatible with E85. The manufacturer of the submersible pump clarified that the E85 vapors had caused the paint on the submersible pump housing to run causing the appearance of corrosion. It was confirmed that none of the internal components were affected. The manufacturer confirmed that the paint formulation used on the submersible pump had changed and that they would monitor other sites across the country for any further instances relating to paint degradation. The site was monitored for any further issues and to this date none have arisen.

Case Study – Iowa



- Site Location: Iowa
- Fuel Type: E85 Product Type: Gasoline/Ethanol Blend
- Issue Type: Tank
- Tank Construction: Single Walled Tank Material: Steel
- Tank Capacity: 10,000 gallons Installation Date: unk
- Current Tank Age: unk
- *Description of Issue:*

Tank not considered when converting from E10 to E85.
Ethanol has the ability to expose previously plugged pinholes
in storage tanks formed as a result of corrosion.

Case Study – Iowa

- *Findings and Resolution:*
Release occurred. Tank was removed and remediation conducted.



Best Management Practices

- Implement database tracking mechanisms for alternative fuel storage and use.
- Implement a notification requirement for change of fuel stored in a UST system
- Implement a permitting process for installation of new or upgraded UST systems storing alternative fuels.
- Incorporate an equipment compatibility evaluation
- Ensure existing UST systems are properly cleaned and free of water before switching to alternative fuel storage.

Best Management Practices

- Ensure all tank top fillings are tight and will prevent ingress of water into the UST.
- Require periodic monitoring for the presence of water in the UST and its removal.
- Include your states equipment compatibility evaluation methodology in you're A/B operator training curriculum.
- Require periodic and annual walk through inspections of UST system by trained A/B operators.